



# HC 400 / 500

High Performance Horizontal Machining Center



# High Performance Horizontal Machining Center

High Speed, Precision and Highly Efficient, Space Saving Machine Offers Excellent Productivity. Get precision and reliability for a wide range of automation application and machining of any material. Combined with advanced technology feature to provide exceptional values.

## HC 400 / 500

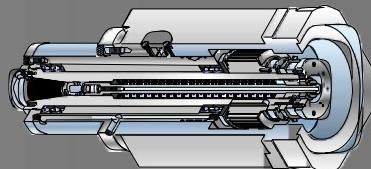




# High Speed Spindle

Powerful high-speed and precision.

The high speed 8000 r/min 40 taper spindle is a true cartridge type unit supported by four precision class P4 high speed bearings which are permanently greased and lubricated. The spindle is driven by a high torque 18.5 kW A.C. motor delivering an impressive 235.5 N·m on HC 400.



Max. spindle speed  
**8000 r/min**  
{10000 r/min}

Motor (15min)  
**18.5 kW**  
{26 kW}

Max. spindle torque  
**235.5 N·m (15 min) HC 400**  
**353.4 N·m (5 min) HC 500**

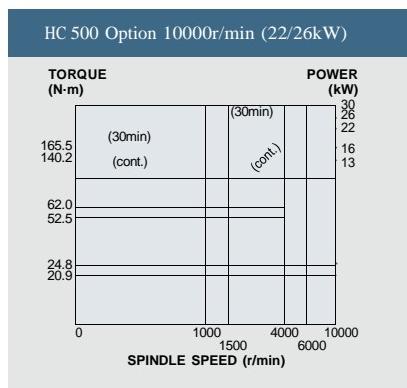
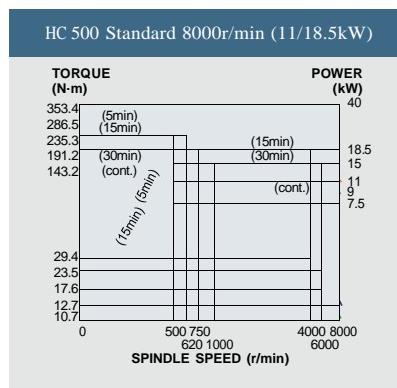
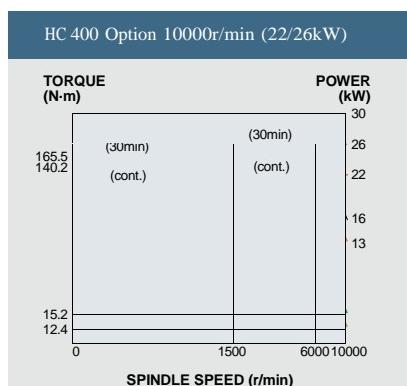
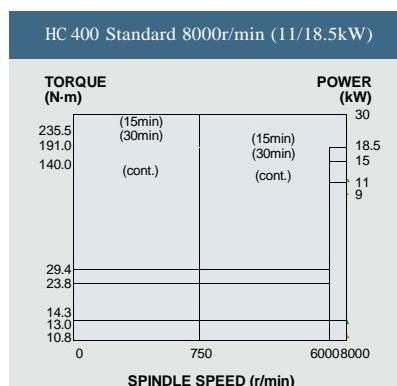
{ } : Option

Spindle power-torque diagram



Oil cooler

A refrigerated spindle cooling system circulates cooling oil to maintain a constant temperature for high accuracy, regardless of the ambient temperature or cutting conditions.



# Tool Magazine

## Automatic tool changer

Tool change time

**1.5 s (T-T-T)**

Sophisticated mechanisms drastically reduce non-cutting time.



Tool storage capacity

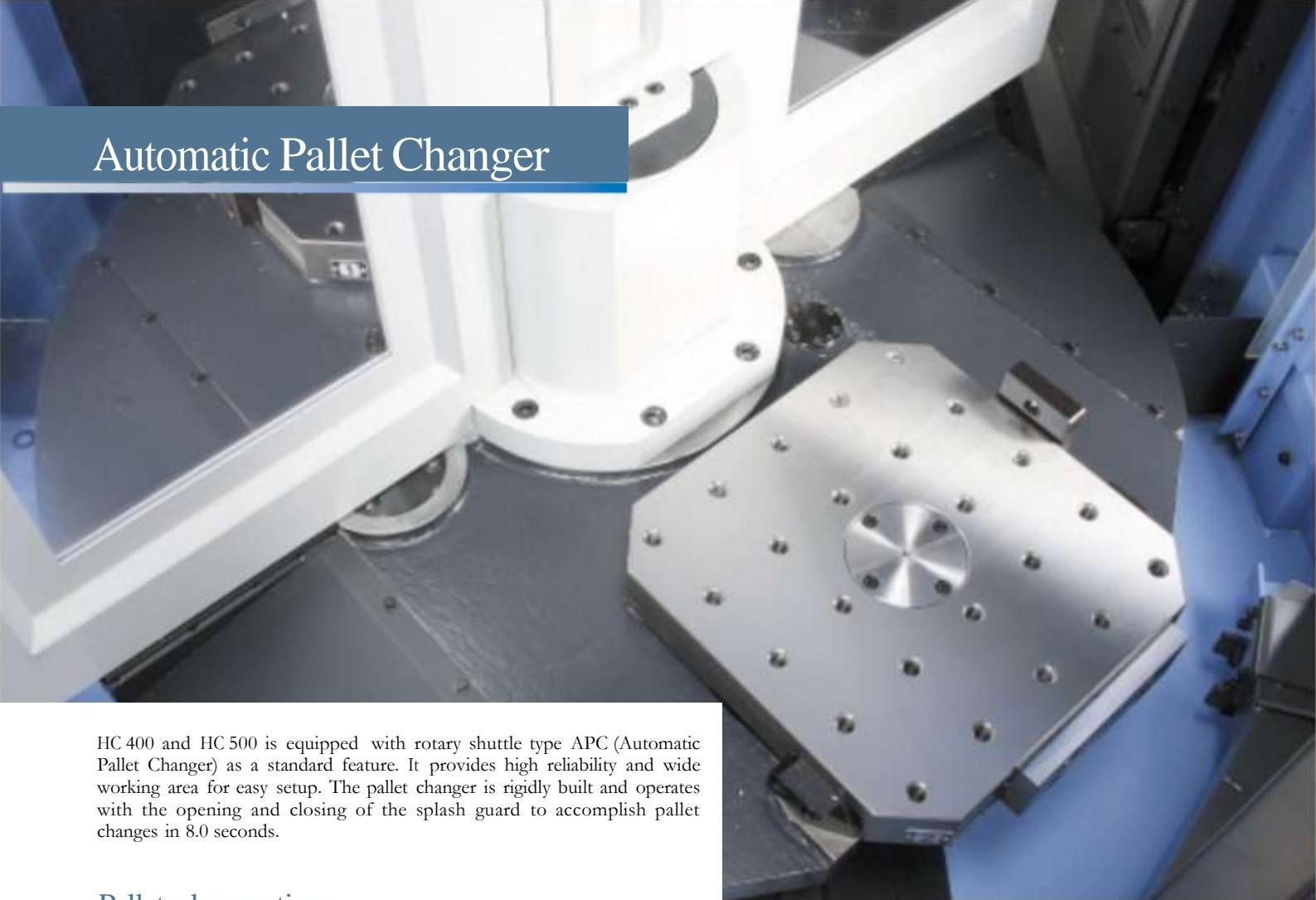
**40 tools**  
**{Opt:60/120/170/262}**

The ATC is composed of tool magazine and change arm. The tools are selected by a fixed address method that follows the shorter path. All tools are returned to the pots from which they were originally taken so that collision problems involving large-sized tools need to be considered only once when they are first mounted.



Tool driving mechanism  
- Servo type

# Automatic Pallet Changer



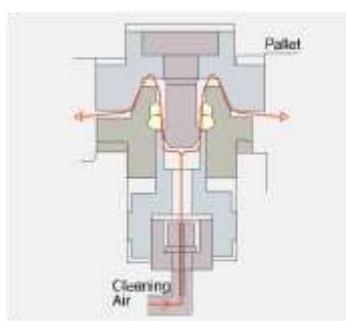
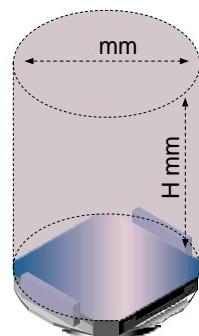
HC 400 and HC 500 is equipped with rotary shuttle type APC (Automatic Pallet Changer) as a standard feature. It provides high reliability and wide working area for easy setup. The pallet changer is rigidly built and operates with the opening and closing of the splash guard to accomplish pallet changes in 8.0 seconds.

Pallet change time

**8.0 s (HC 400)**

**8.5 s (HC 500)**

Max. Workpiece Size.



The possibility that chips might degrade the meshing accuracy of the pallet positioning mechanism increases at higher machining speeds. On the HC 400 and HC 500 strong jets of air are discharged from the tapered cones when a pallet is changed to clean any chips from the cones and assure accurate pallet positioning.

	HC 400		HC 500	
Pallet size	400	400mm	500	500mm
Max.workpiece size	600	H 800mm	800	H 900mm
Max.workpiece weight	400 kg		500 kg	

## Rigid structure bed and column



Travel axes (X/Y/Z)

HC 400 **600/560/565 mm**

HC 500 **850/700/750 mm**

The machine is designed to build rigidity into a stable body. The construction of the machine was thoroughly examined from the stage of basic design to ensure consistent high-speed and high-accuracy operation. The deformation of the bed when subject to a load at the center was simulated to secure high level rigidity against bending. The HC 400 and HC 500 have an design with a basic structure using FEM advanced technology.

## Guideways and Axis Drives



Rapid traverse

HC 400 **40 m/mim**

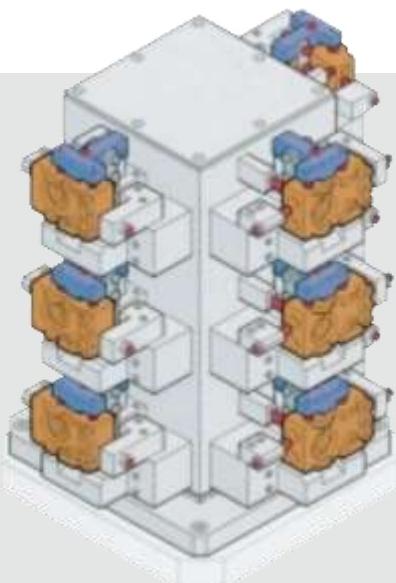
HC 500 **40 m/mim**

The feed mechanism adopts heavy duty linear motion roller guideways that provide superior acceleration/deceleration performance to reduce non-cutting time.



HC Series with oversized AC servo drives power through the toughest cuts in the toughest metal. The high torque servos are coupled directly to the ball screws. With no gears there is no risk of backlash or servo drag.

# Interface for Fixture



Fixture check list  
(for hydraulic/pneumatic fixtures)

Number of Ports

2\*<sup>1</sup> 2\*<sup>2</sup> Line

2\*<sup>1</sup> 3\*<sup>2</sup> Line

2\*<sup>1</sup> 4\*<sup>2</sup> Line

2\*<sup>1</sup> 6\*<sup>2</sup> Line

2\*<sup>1</sup> 8\*<sup>2</sup> Line

\*<sup>1</sup> : Pallet No. 1 and No. 2

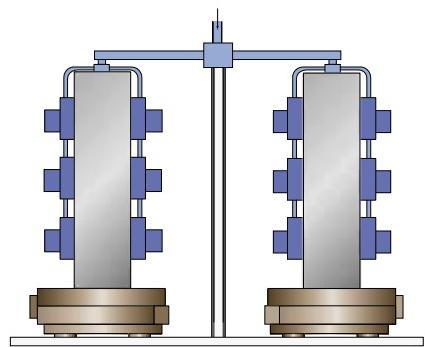
(Number of Pallet)

\*<sup>2</sup> : Number of port line

Hydraulic power unit

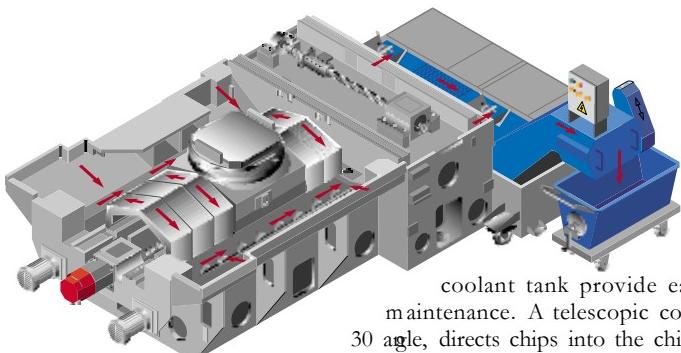
Special requirement

\_\_\_\_\_ L/min at \_\_\_\_\_ MPa



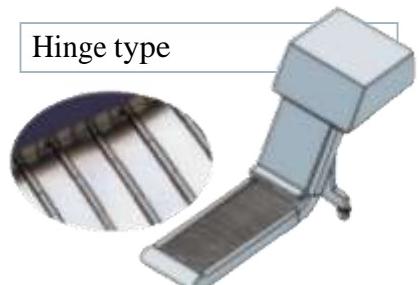
Contact Doosan Infracore for more information

# Chip Disposal

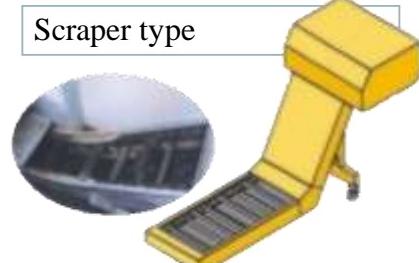


Separate chip conveyor and coolant tank provide easy cleaning and maintenance. A telescopic cover, inclined at a 30 angle, directs chips into the chip sliding cover to keep the area around the table clean. From the sliding cover, chips are flushed onto the chip conveyor by the screw conveyors to make quick and easy work of chip removal.

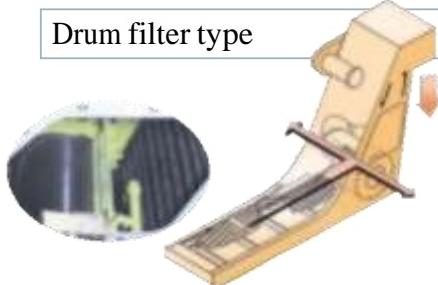
Hinge type



Scraper type



Drum filter type



Chip conveyor (Option)				
	Steel	Cast	Aluminum and nonferrous metals	Compound
Specifications				
Hinge type				
Scraper type				
Drum filter type				

- :Available    :Unavailable    :Asking for information

- Some types of chips may not be completely removed from the chip conveyor.
- Contact Doosan for more information.

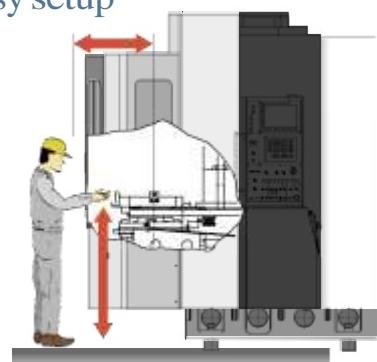
# Ergonomic and Eco-Friendly Design



Adjustable thin operator's panel



## Easy setup



## Distance to table

HC 400 **380 mm**

HC 500 **500 mm**

## Height to table

HC 400 **1130 mm**

HC 500 **1160 mm**

## Collection of waste lubrication oil

Less waste lubrication oil extends the life time of the coolant water and cut down the grime and offensive smell of the machine inside.

## No coolant leakage

Rigorously designed, manufactured and tested machine covers do not permit coolant leakage in any condition. The factory always keeps our environment clean.

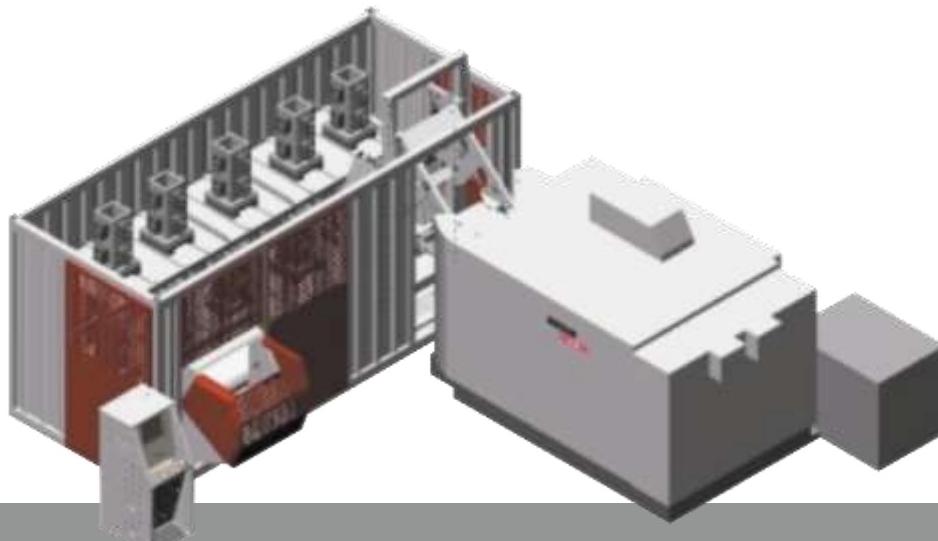
## Oil skimmer (opt.)

Another suggestion to prolong the life time of the coolant water. A belt-driven type oil skimmer picks up and removes waste oil from the coolant tank that is easily drained.



# Flexible Multi Pallet System

High Productivity & availability  
Flexible production solutions  
High efficiency system  
Compact designed technology  
Easy to extend stations  
(7,9,11,13st)



## Application of multi pallet system

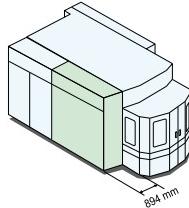
Name	HC 500 (2 sets)
Number of Setup Station	1
Storage Capacity (500 - 500)	18 cells

Application technology of Multi-pallet system is the best solution for the high productivity in the machining shop.

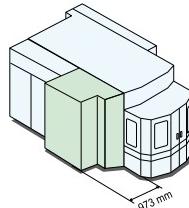
## Tool magazine

Numerous Variations to meet production efficiency needs.

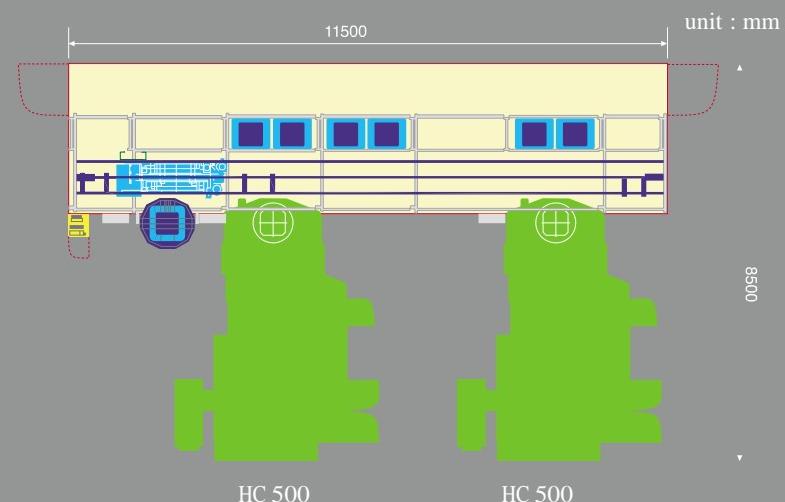
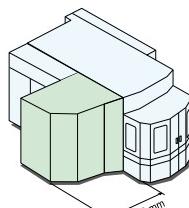
### 60-tool (opt.)



### 120-tool (opt.)



### 170-tool (opt.)

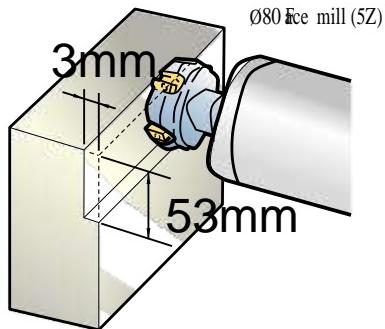


# Cutting Performance

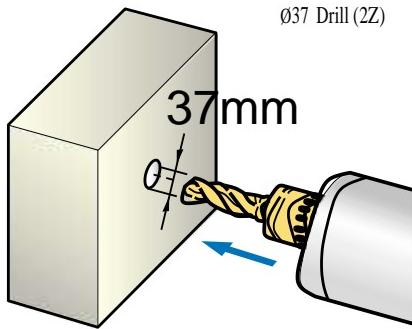
Guarantees high-productivity and high-accuracy in a variety of machining operations

## HC 400

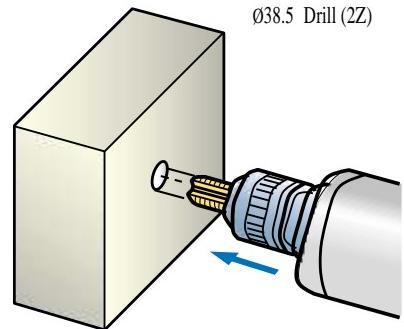
ill SM45C



Drill Gray casting (GC25)



Tap Gray casting (GC25)



Machining rate

**380 cm<sup>3</sup>/min**

Spindle speed

1500 r/min

Feedrate

1200 mm/min

Feedrate

**210 mm/min**

Spindle speed

250 r/min

Tool

**M30 P3.5**

Spindle speed

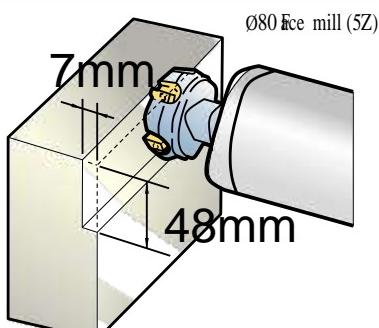
320 r/min

Feedrate

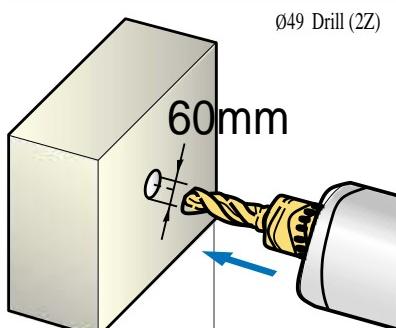
1120 mm/min

## HC 500

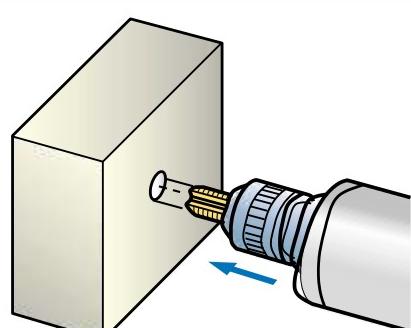
ill m



Drill Gray casting (GC25)



Tap Gray casting (GC25)



Machining rate

**2318 cm<sup>3</sup>/min**

Spindle speed

2390 r/min

Feedrate

6900 mm/min

Feedrate

**100 mm/min**

Spindle speed

125 r/min

Tool

**M30 P3.5**

Spindle speed

320 r/min

Feedrate

1120 mm/min

## Standard Features

H C 400 / 500



Flood coolant



Operator call lamp (red/yellow/green)



FANUC 21i-MB controller



Portable MPG



Work light



APC operator's panel



Rigid tapping



Oil cooler



Screw conveyor

# Optional Equipment



Multi pallet system



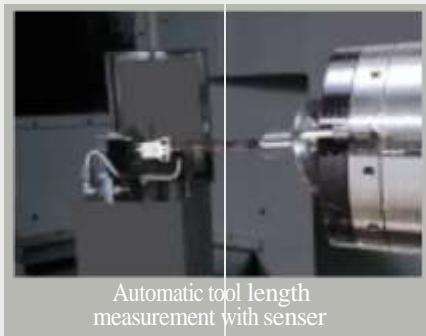
120 Tools



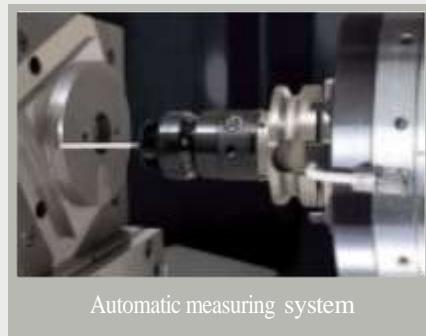
Matrix Magazine (170 Tools)



Linear scale feedback system



Automatic tool length measurement with sencer



Automatic measuring system



Built in Rotary Table (0.001°)



FMS



Through the spindle coolant



Chip conveyor / Bucket



T-slot pallet



Shower coolant

Coolant chiller Hyd. cooling /

Heating device Center bush

Automatic power off

Tool monitoring system

Test bar Air gun

Hydraulic line for fixture

HSK tooling

Rear side chip conveyor

# Easy Operating System



## Standard Features

High compact CNC is realized through LCD display with integrated CNC and a flash memory card interface is standard features.  
Provides many support functions for set-ups, such as tool measurement, workpiece measurement at the original point, and workpiece measurement inside the machine.  
Uses one display screen to perform all operations including programming, checking by animation, and real machining.  
User-Friendly Operation : Soft key Selection of Comprehensive Cycle Library



## Guide for machining preparation

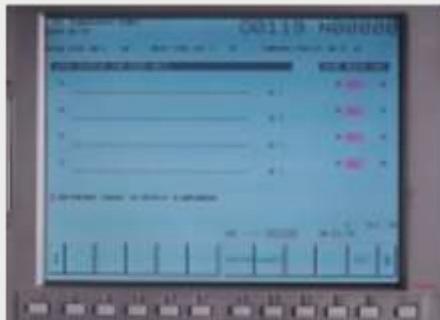
In preparation for machining, simple instructions on a selected screen allow to measure the setting error of workpiece and tool offset value for automated adjustment.



# Tool Monitoring System (Opt.)

Tool Monitoring System is one of safety functions to protect Tool and Spindle against a possible damage of abnormal load caused by tool wear and breakage or others. This system monitors the tool status during machine operation by detecting the abnormal load of each axis and spindle.

Tool load monitoring system



The screen shows a tool and pallet No., load meter of each axis and spindle limit load.

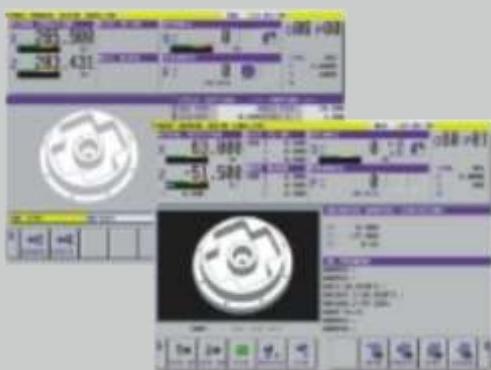
Tool management function



This function consisted of tool pre-check function, substitutive tool selection with tool life management and different tool & port number command function.

## Easy operation system

One single screen provides handy operation guidance for programming through machine operation.



For machining center, turning center and compound machine with milling and turning.

Solid modeling provides high speed animation. (TFT-LCD Color Only)

Icon menu soft-keys provide convenient programming for sophisticated milling and turning.

Measurement cycles provide automatic offset measurement of workpiece (Available for machining center and for compound machine).

## Machining condition selecting function

One single screen provides convenient operation & parameter setting for high speed and high precision machining instructions.



Registration of parameter sets for high speed machining and/or for high precision machining with machine configurations.

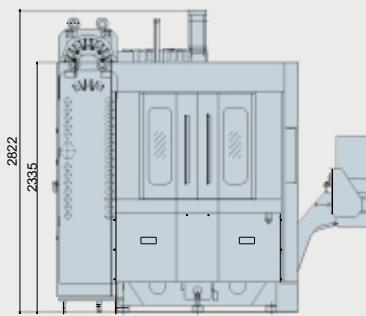
Instruction of precision level for desired machining selects appropriate parameters automatically.

Precision level can be instructed through NC program.

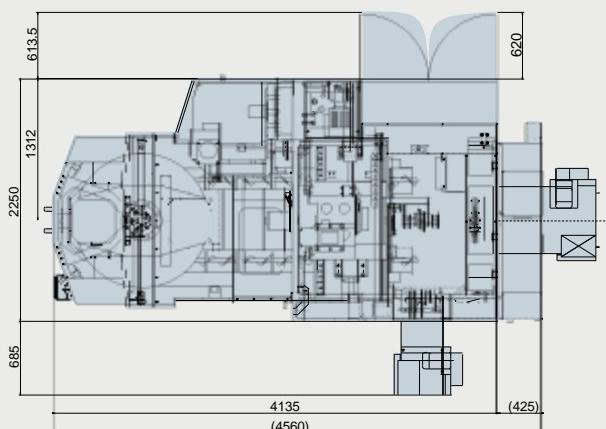
# External Dimensions

## HC 400

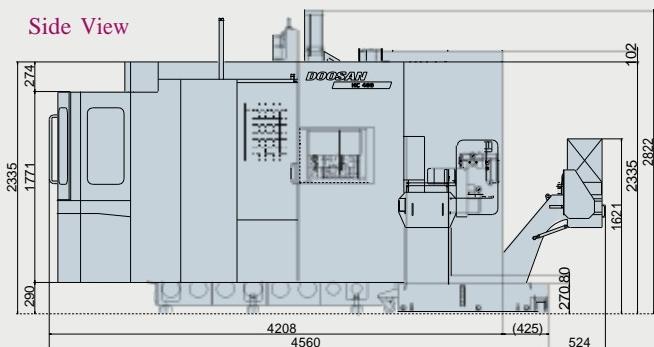
Front View



Top View

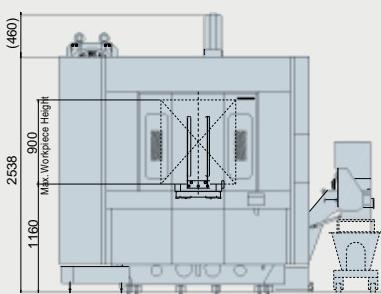


Side View

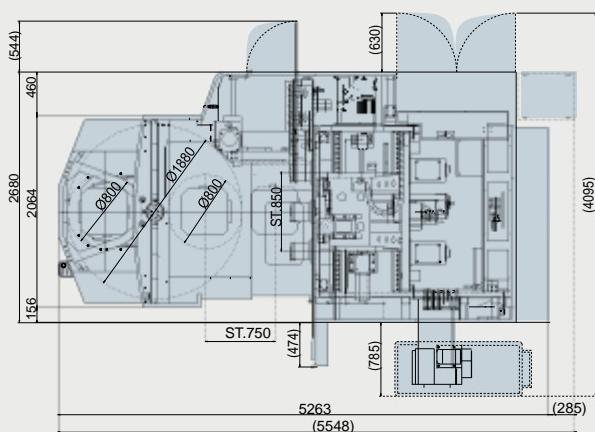


## HC 500

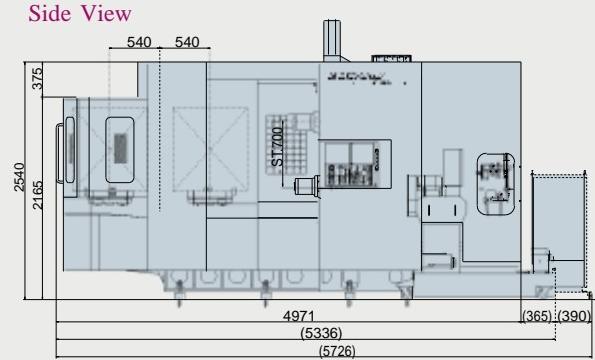
Front View



Top View



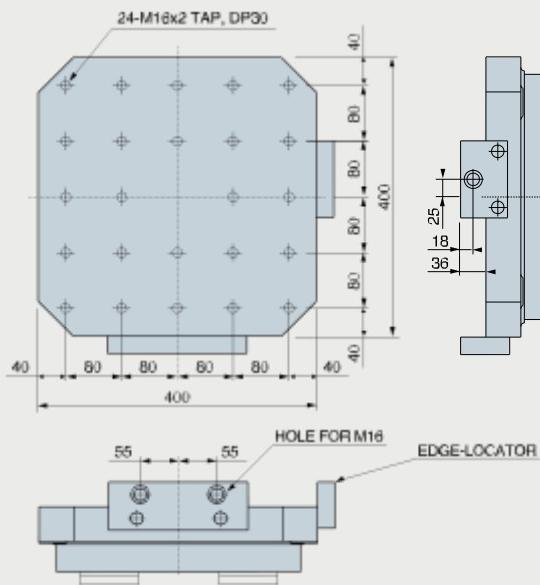
Side View



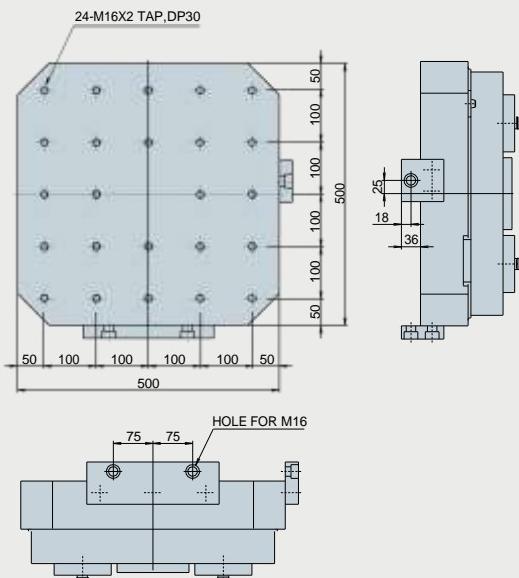
unit : mm

# Pallet Dimensions

**HC 400**



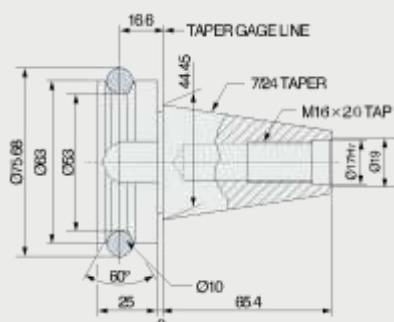
**HC 500**



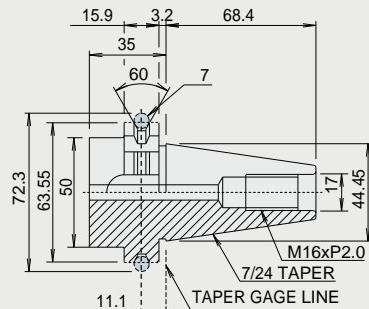
unit : mm

# Tool Shank

Std : BT40

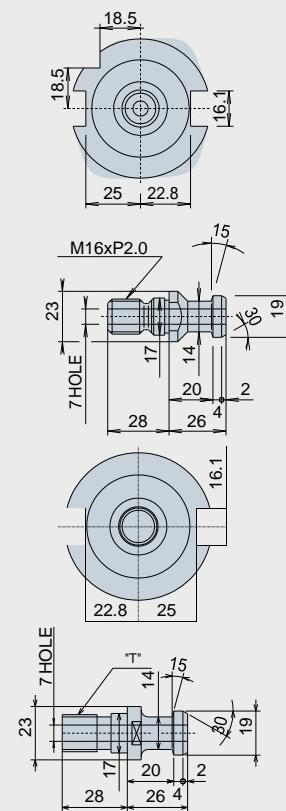
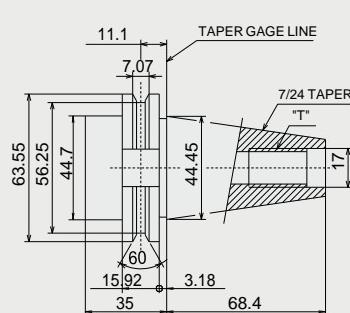
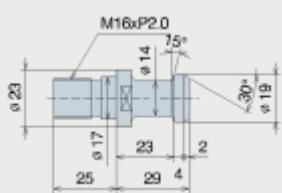


Opt. : DIN 40



unit : mm

Opt. : CAT 40



# Machine Specifications

	Descriptions		HC 400	HC 500
<i>Travel</i>	X-axis (column longitudinal)	mm	600	850
	Y-axis (head vertical)	mm	560	700
	Z-axis (pallet table cross)	mm	565	750
	Distance from spindle center to pallet top	mm	50 ~ 610	50 ~ 750
	Distance from spindle nose to table center	mm	150 ~ 715	150 ~ 900
<i>Table</i>	Pallet size	mm	400 x 400	500 x 500
	Pallet loading capacity	kg	400	500
	Pallet surface		24 - M16 x P2.0	
	Pallet index degree		1° {0.001°} Max.	
<i>Spindle</i>	spindle speed	r/min	8000 {10000}	
	Spindle taper		ISO #40, 7/24 Taper	
	Max. spindle torque	N·m	235.5 {165.5}	353.4 {165.5}
<i>Feedrate</i>	Rapid traverse rate (X/Y/Z)	m/min	40/40/40	
	Cutting feedrate	mm/min	20000	
<i>Automatic tool changer</i>	Type of tool shank		MAS403 BT40	
	Tool storage capacity		40 {60/120/170/262}	
	Max. tool diameter	mm	ø75	
	Max. tool diameter without adjacent tools	mm	ø140	
	Max. tool length	mm	300	400
	Max. tool weight	kg	10	
	Method of tool selection		Fixed address	
	Tool change time (tool-to-tool)	s	1.5	
	Tool change time (chip-to-chip)	s	4	
<i>Automatic pallet changer</i>	Number of pallet	ea	2	
	Type		Rotary Type	
	Pallet change time	s	8	8.5
<i>Motor</i>	Pallet rotation in loading station	deg	90	
	Spindle motor(15min)	kW	18.5 {26}	
	Feed motor(X/Y/Z/B)	kW	4.0/4.0/4.0/1.6	
<i>Power source</i>	Electric power supply (Rated capacity)	kVA	48.7	65
	Compressed air supply	MPa	0.54	
<i>Tank capacity</i>	Coolant tank capacity	L	550	650
	Lubrication tank capacity	L	1.32	
<i>Machine size</i>	Machine height	mm	2830	3020
	Machine dimension(L x W)	mm	4560 x 2250	5290 x 2680
	Machine weight	kg	11000	12500

Note : { } are optional

## Standard Feature

- |                               |  |                  |
|-------------------------------|--|------------------|
| • Assembly & Operation tools  | • Full enclosure splash guard              | • Rigid tapping  |
| • Coolant tank, flood coolant | • Installation parts                       | • Screw conveyor |
| • Door interlock for safety   | • Oil cooler & Spindle head cooling system | • Work light     |
| • FANUC 32i-A controller      | • Operator call lamp (red, yellow, green)  |                  |

- Design and specifications are subject to change without notice.
- Doosan is not responsible for difference between the information in the catalogue and the actual machine.

# NC Unit Specifications (Fanuc 32i-A)

AXES CONTROL	
- Controlled axes	4 (X, Y, Z, B)
- Simultaneously controllable axes	4 axes
	Positioning(G00)/Linear interpolation(G01) : 3 axes
	Circular interpolation(G02, G03) : 2 axes
- Backlash compensation	
- Emergency stop / overtravel	
- Follow up	
- Least command increment	0.001mm / 0.0001"
- Least input increment	0.001mm / 0.0001"
- Machine lock	All axes / Z axis
- Mirror image	Reverse axis movement (Setting screen and M - function)
- Stored pitch error compensation	Pitch error offset compensation for each axis
- Stored stroke check 1	Overtravel controlled by software
INTERPOLATION & FEED FUNCTION	
- Positioning	G00
- Linear interpolation	G01
- Circular interpolation	G02, G03
- Dwell	G04
- Exact stop check	G09, G61 (mode)
- Skip function	G31
- Reference point return check	G27
- Reference point return	G28
- 2nd reference point return	G30
- Feed per minute	mm / min
- Rapid traverse override	F0 (fine feed), 25 / 50 / 100 %
- Feedrate override (10% increments)	0 - 200 %
- Jog override (10% increments)	0 - 200 %
- Override cancel	M48 / M49
- Manual handle feed (1 unit)	
- Manual handle feedrate	0.1 / 0.01 / 0.001 mm
- Automatic acceleration/deceleration	
- Helical interpolation	
- AI CONTOUR II	80 block preview
- Machine condition selection function	
- Thread cutting, synchronous cutting	
- Program restart	
- Automatic corner deceleration (Specify AI Contour control II)	
- Feedrate clamp by circular acceleration	
- Linear ACC/DEC before interpolation (Specify AI Contour control II)	
- Linear ACC/DEC after interpolation	
- Control axis detach	
- Rapid traverse bell-shaped acceleration/deceleration	
- Smooth backlash compensation	
SPINDLE & M-CODE FUNCTION	
- M- code function	M 3 digits
- Spindle orientation	
- Spindle serial output	
- Spindle speed command	S5 digits
- Spindle speed override (10% increments)	10 - 150 %
- Spindle output switching	
- Retraction for rigid tapping	
- Rigid tapping	G84, G74
TOOL FUNCTION	
- Tool nose radius compensation	G40, G41, G42
- Number of tool offsets	200 ea
- Tool length compensation	G43, G44, G49
- Tool number command	T3 digits
- Tool life management	
- Tool offset memory C	H/D code, Geometry / Wear memory
- Tool length measurement	
PROGRAMMING & EDITING FUNCTION	
- Absolute / Incremental programming	G90 / G91
- Auto. Coordinate system setting	
- Background editing	
- Canned cycle	G73, G74, G76, G80 - G89, G99
- Circular interpolation by radius programming	
- Plane selection	G17, G18, G19
- Custom macro B	
- Custom software size	512kb
- Extended P-code Variables size	512kb
- Addition of custom macro common variables	#100 - #199, #500 - #999
- Decimal point input	
- Reader/puncher interface	RS - 232C
- Inch / metric conversion	G20 / G21
- Label skip	
- Local / Machine coordinate system	G52 / G53
- Maximum commandable value	+99999.999mm (+9999.999 inch)
- Part program storage size	(640m) 256kb

- No. of Registered programs	500 ea
- Optional block skip 1	
- Optional stop	M01
- Program file name	32 characters
- Sequence number	N 8-digit
- Program protect	
- Program stop / end	M00 / M02, M30
- Programmable data input	Tool offset and work offset are entered by G10, G11
- Sub program call	Up to 10 nesting
- Tape code	ISO / EIA Automatic discrimination
- Work coordinate system	G54 - G59
- Additional work coordinate system (48 Pairs)	G54.1 P1 - 48 pairs
- Coordinate system rotation	G68, G69
- Extended part program editing	
- Optional chamfering corner R	
- Macro executor	
OTHERS FUNCTIONS (Operation, Setting & Display, etc)	
- Alarm display	
- Alarm history display	
- Actual cutting speed display	
- Clock function	
- Cycle start / Feed hold	
- Display of PMC alarm message	Message display when PMC alarm occurred
- Dry run	
- Ethernet function (Embedded)	
- Graphic display	Tool path drawing
- Help function	
- Loadmeter display	
- DISPLAY/MDI unit	10.4" color TFT LCD / Keyboard for data input, soft-keys
- Memory card interface	
- Operation functions	Tape / Memory / MDI / Manual
- Operation history display	
- DNC operation with memory card	
- Program restart	
- Run hour and part number display	
- Search function	Sequence NO. / Program NO.
- Self - diagnostic function	
- Servo setting screen	
- Single block	
- External data input	
- Multi language display	
OPTIONAL SPECIFICATIONS	
- 3-dimensional coordinate conversion	
- Addition of tool pairs for tool life management	1024 pairs
- Additional controlled axes	Max. 6 axes per path
- Automatic corner override	G62
- Chopping function	G81.1
- Cylindrical interpolation	G07.1
- Data server	
- Dynamic graphic display	Machining profile drawing => When the EZ Guide i is used, the Dynamic graphic display cannot application
- Interpolation type pitch error compensation	
- EZ Guide i (Doosan infracore Conversational Programming Solution)	
- Tape format for FS15	
- Increment system 1/10	
- Figure copying	G72.1, G72.2
- Manual handle feed 2/3 unit	
- Handle interruption	
- High speed skip function	
- Machining time stamp function	
- No. of Registered programs	1000 ea
- Number of tool offsets	400 ea
- Optional block skip addition	2~9 blocks
- Part program storage	512KB (1280m) (Max.2Mbyte) 1MB (2560m)
- Playback function	
- Polar coordinate command	G15 / G16
- Polar coordinate interpolation	G12.1 / G13.1
- Programmable mirror image	G50.1 / G51.1
- Remote buffer	
- Scaling	G50, G51
- Single direction positioning	G60
- 3rd / 4th reference return	
- Stored stroke check 2 / 3	
- Tool load monitoring function (Doosan)	
- Doosan tool management package I	
- Tool offset	G45 - G48
- Position switch	
- Optional angle chamfering / corner R	

\*<sup>)</sup> Prior consultation is required.

# HC 400 / 500



<http://www.doosaninfracore.com/machinetools>

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